

CLAIMS

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1. A golf club, comprising: a club head, and a shaft connected to the club head, said club head including a body having a ball striking face wall and a perimeter wall extending rearwardly from the face wall, and an abutment fixed in the club head body spaced rearwardly from the ball striking face wall positioned sufficiently close to the face wall so the face wall impacts the abutment at a given club head speed, said abutment including a generally planar wall fixed in the club head body extending behind and across a substantial portion of the ball striking face wall.

2. A golf club as defined in Claim 1, wherein the face wall is thinner than .100 inches, and the generally planar wall has reinforcing elements on its rear surface.

3. A golf club as defined in Claim 1, wherein the generally planar wall is substantially parallel to and extends across the ball striking face wall.

4. A line of golf clubs designed to customize the golf club to the swing speed range of the golfer, comprising: a plurality of golf clubs each including a club head with a shaft connected thereto, each of the club heads including a body with a ball striking face wall and a perimeter wall extending rearwardly from the ball striking face wall, a generally planar secondary wall in the club head body, generally parallel to and extending a substantial distance across and behind the ball striking face wall, the ball striking face wall in at least one of the golf clubs

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1 having a higher modulus of elasticity than the ball striking
2 face wall in at least another of the golf clubs, said second-
3 ary wall being spaced sufficiently close to the ball strik-
4 ing face wall so the face wall impacts the secondary wall at
5 a given club head speed.

6
7 5. A line of golf clubs as defined in Claim 4,
8 wherein the ball striking face wall in at least one of the
9 golf clubs is generally thinner than the ball striking face
10 wall in another of the golf clubs.

11
12 6. A line of golf clubs as defined in Claim 4,
13 wherein the secondary wall is spaced further from the ball
14 striking face wall in at least one of the golf clubs than
15 the secondary wall is spaced from the ball striking face
16 wall in at least another of the golf clubs.

17
18 7. A line of golf clubs as defined in Claim 4,
19 wherein the club head body has a standardized configuration,
20 said face wall including a plurality of different modulus
21 face walls interchangeable in the standardized club head
22 body.

23
24 8. A line of golf clubs as defined in Claim 4,
25 wherein the face walls have different thickness to vary the
26 face modulus in each.

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1 9. A line of golf clubs as defined in Claim 4,
2 wherein the higher modulus face wall club head has a secon-
3 dary wall spaced closer to the face wall than the lower
4 modulus face wall club head secondary wall.

5

6 10. A line of golf clubs, comprising: a
7 plurality of golf clubs each including a club head body
8 having a shaft connected thereto, said club head body being
9 standardized within the line and including a perimeter wall
10 and a face wall receiving element, and a plurality of dif-
11 ferent modulus of elasticity face walls fixed to the body
12 face wall receiving element.

13

14 11. A line of golf clubs as defined in Claim 10,
15 wherein the face walls have a progressively increasing
16 thickness in the line.

17

18 12. A line of golf clubs as defined in Claim 10,
19 wherein the club head body has an abutment wall spaced from
20 and immediately behind the face wall, said abutment wall
21 being sufficiently close to the face wall so the face wall
22 impacts the abutment wall at a given swing speed.

23

24 13. A golf club head, comprising: a club head
25 body having a ball striking face wall and a perimeter wall
26 extending generally rearwardly from at least a portion of
27 the ball striking face wall, said face wall being relatively
28 thin to enhance face deflection at the club head speeds for
29 which the club head is designed, and means for minimizing

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1 the ball striking face wall from exceeding its elastic limit
2 including a generally planar wall closely spaced behind the
3 ball striking face wall.

4
5 14. A golf club head, comprising: a head body
6 having a ball striking face wall and a perimeter wall ex-
7 tending generally rearwardly from at least a portion of the
8 ball striking face wall, said face wall being the thinnest
9 possible without exceeding about 80% of the elastic limit
10 for the upper club head speed for which the club head is
11 designed, and a secondary planar wall in the club head
12 separate from the face wall for permitting free flexure of
13 face wall in a lower speed range and for limiting face wall
14 deflection to minimize face wall exceeding its elastic limit
15 in an upper speed range.

16
17 15. A golf club head designed to augment ball
18 exit velocity, comprising: a club head body having a face
19 wall, a generally rearwardly extending perimeter wall about
20 at least a portion of the face wall, the face wall being
21 relatively thin to maximize face deflection and face energy
22 applied to the ball without exceeding the elastic limit of
23 the face, said face thickness being selected so the face has
24 a first lower modulus of elasticity in a lower swing speed
25 range, and a secondary planar wall in the club head body for
26 providing the face wall with a higher modulus of elasticity
27 in a second higher swing speed range.

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1 16. A golf club head as defined in Claim 15,
2 wherein the second higher modulus of elasticity occurs at
3 about 80% of the elastic limit of the face wall.
4

5 17. A golf club head as defined in Claim 15,
6 said secondary planar wall in the club head body for provid-
7 ing the face wall with a second higher modulus of elasticity
8 in a higher speed range limits movement of the face wall
9 rearwardly along the target line during impact with a ball.
10

11 18. A golf club head as defined in Claim 17,
12 wherein said secondary wall is spaced from the face wall to
13 retard movement of the face wall after a deflection that ap-
14 proaches the elastic limit of the face wall, said spacing
15 being selected so that when the face wall strikes the secon-
16 dary wall, the face wall is about at least 80% of its elas-
17 tic limit.
18

19 19. A golf club head as defined in Claim 15,
20 wherein the secondary wall in the club head for providing
21 the face wall with a second higher modulus of elasticity in
22 a speed range extends substantially across the face wall and
23 has a plurality of reinforcing ribs thereon.
24

25 20. A line of golf clubs production customized
26 for golfers' swing speeds, comprising: a plurality of golf
27 club heads having similar shapes and weights, a plurality of
28 shafts connected to the club heads, each of said club heads
29 having a ball striking face wall and a perimeter wall that
30 extends rearwardly from at least a portion of the face wall,

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1 said line of clubs being constructed so that modulus of
2 elasticity of the face walls in each of a plurality of dis-
3 crete swing speed ranges increases as the swing speed ranges
4 increase, said face modulus of elasticity being low in a
5 lower portion of each of the speed ranges to provide in-
6 creased face wall deflection near the elastic limit of the
7 face wall in each swing speed range, and a secondary planar
8 wall to increase the modulus of elasticity in each club in
9 the line in an upper portion of each of the swing speed
10 ranges.